REMARKS/ARGUMENTS

In response to the Office Action dated February 1, 2010, Applicants amend their application. In this Amendment, claims 12, 15, 17, 20-23, and 26 are newly cancelled and new claim 27 is added. Accordingly, claims 1, 11, 13, 16, 18, 19, 24, 25, and 27 are now pending.

Information Disclosure Statement

Four Information Disclosure Statements have been filed in the prosecution of this patent application and the Examiner has indicated consideration of only three of those Information Disclosure Statements. No acknowledgement of consideration of the publications cited in the Information Disclosure Statement filed June 17, 2009, and given the cited publication numbers C1, C2, and C3 has been received. An indication of consideration of those publications in the next communication is respectfully requested.

Responses to Formality Rejections

In the Office Action, claim 1 and its dependent claims were objected to because of the forward slashes, "/", in claim 1. Claim 1 has been amended, consistent with the specification, and the slashes have been eliminated.

All of the formerly pending claims were rejected as indefinite because of the phrases "non-network application" and "non-TCP port" in claims 1 and 19. The questioned terms do not appear in amended claim 1 and claim 19 has been cancelled.

Prior Art Rejections

Claim 1 and dependent claims 11 and 13 were rejected as unpatentable over "Dedicated Short-Range Communication System, ARIB STANDARD, Version 1.0" (referred to as ARIB STD-T75), in view of the DSRC International Task Force

document, titled "DSRC in Japan" (hereinafter DSRC ITS), and Garinger et al. (Published U.S. Patent Application 2004/0017820, hereinafter Garinger).

Claims 16 and 18, dependent claims also depending from claim 1, were rejected on the same basis as claim 1 and further in view of Wang et al. (U.S. Patent 6,834,326, hereinafter Wang).

Claim 19 was rejected as unpatentable over ARIB STD-T75 in view of Fite, Jr. et al. (U.S. Patent 6,496,502, hereinafter Fite).

Claims 24 and 25 were rejected as unpatentable over ARIB STD-T75 in view of Young et al. (Published U.S. Patent Application 2003/0033418, hereinafter Young).

The rejections are all respectfully traversed as to the claims now pending.

This Amendment

Upon entry of this Amendment the only pending independent claims are claim 1 and claim 27, claims directed to a communication system and a method of communication, respectively. Claim 1 has been amended with respect to certain issues of clarity and is not substantively changed. Claim 11 has been amended by incorporating substantially the limitation of former dependent claim 15, resulting in the cancellation of claim 15. Claim 16 has been amended to explain with greater precision the bulk area used by the transaction management entity. The amendment to claim 16 explains that the bulk area is prepared by an application running on the system. Claim 19 has been rewritten as a dependent claim depending from claim 1. Redundant limitations are removed from claim 19 to avoid duplication with identical limitations of claim 1.

New independent claim 27 describes a method of communicating between a roadside unit and an on-board mobile unit in a vehicle. The method requires a number of steps be performed within various layers of the claimed system. As described in the specification, the layer structure includes an application layer, a local port protocol (LPP) layer, a local port control protocol (LPCP) layer, an extended link control protocol (ELCP) layer, and a dedicated short-range communication (DSRC) protocol

layer. See Figures 1 and 3 of the patent application and the specification at pages 12 and 13.

By incorporating the LPP and LPCP layers, the invention provides communication capacities much greater than those defined in the ARIB STD-T75 standard. See the specification at page 3, line 22 to page 3, line 6, and page 5, line 24 to page 7, line 7. In doing so, a number of functionalities, such as data segmentation, assembling, and encapsulation, are performed within the newly added protocol layers (i.e., the LPP and LPCP layers), which reside above the conventional DSRC layer.

As shown in Figures 1 and 23, the conventional DSRC system supports applications (e.g., APPLICATION 5) which are implemented directly on the DSRC protocol layer. That layer identifies the applications by their application identifier (i.e., AID). Also, see Figures 2.5.1 and 4.4.3.3 of ARIB STD-T75.

In contrast to the conventional DSRC system, the newly added layers, as defined in independent claim 27, allow more flexible implementations of the system in that the applications do not have to comply with the underlying low level DSRC protocol. Specifically, the LPCP layer, which is implemented on the DSRC layer, provides access to a plurality of applications, expanding the number of applications implemented on the DSRC system.

In the described system, by assigning the ELCP layer to an AID, the ELCP layer, including all of the higher protocol layers (i.e., the LPP and LPCP layers) implemented on the ELCP layer, are treated as an application by the lower DSRC layer. The internal structures of these new layers provide communication control mechanisms that are unavailable in the conventional DSRC system. For example, the group of applications implemented on the LPCP layers provide non-network services and are each assigned to a local port number identified by the LPCP layer. See Figure 2, "Non-network-type application." In addition, a number of control protocols, including the LPCP, are implemented upon the ELCP layer. Each control protocol is assigned to an access point, which is used to identify the data directed to each of these protocol layers.

According to new claim 27, a transmitting station segments and encapsulates the application data in data packets, carrying header information for identifying the protocol layers (i.e., the ELCP, LPP and LPCP layers), before the data are passed through the DSRC layer. On the receiving side, the receiving station examines the header information, as the data are passed through the layer structure, and applies processing steps to the data in accordance with the header information, such as the application identifier, the access point number, and the port number.

Response to the Prior Art Rejections

In response to the rejections of the formerly examined and still pending, claims, Applicants reiterate the arguments presented in the Response filed October 22, 2009. As explained there, the system and method described in the patent application provide roadside-to-vehicle communications, without a network layer, based on the DSRC protocol. That important difference distinguishes the invention, as defined by all pending claims, from the prior art.

In the communication system according to claim 1, communication based on Extended Link Control Protocol (ELCP), which is one application of the Dedicated Short-Range Communication (DSRC) protocol, between mobile stations and a base station system employs a transfer service processing entity and a transaction management entity. Both the transfer service processing entity and the transaction management entity are placed over an ELCP and the DSRC protocol in a communication protocol stack. Through this arrangement, multiple applications, which do not utilize an Internet Protocol (IP) and that coexist with known DSRC applications and known IP applications, are realized. Since each of the mobile stations and the base station system includes two separate entities, namely the transfer service processing entity and the transaction management entity high speed connectivity and low overhead are achieved, using only the transfer system entity. See the patent application at page 13, lines 5-15 and page 63, lines 12-25.

The invention as defined by claim 1, and thereby of claims 11, 13, 16, 18, and 19, patentably distinguish from the principal reference, ARIB STD-T75. According to section 4.4.1.3.1 of that publication, the described system has, internally, a multiple application function. By contrast, the present invention provides the multiple application function as an application layer on the ARIB STD-T75. Further, the secondary reference, DSRC-ITS, describes only a general concept of a method for extending a DSRC protocol stack. That publication does not disclose what kind of communication protocol should be aligned between the application and the ELCP. Therefore, the combination of those publications fails to suggest the invention as defined by claim 1.

Garinger was cited at page 9 of the Office Action as describing uniquely identifying transaction IDs, with each transaction combining a source port address and a transaction ID. However, Garinger discloses only a transaction ID that ties a response to a request. According to paragraph [0129] of Garinger, the "source should not have two outstanding transactions with the same transaction ID." Therefore, the Garinger arrangement cannot be used for an application that provides re-sending at an arbitrary time in the communication protocol, data segments, for reassembly as described in the final paragraphs of claim 1. Thus, even the addition of Garinger to the other two references fails to establish *prima facie* obviousness of claim 1 and, therefore, of the other pending claims depending from claim 1.

Claim 11, a dependent claim, further defines and describes the transaction management entity of a sending station and of a receiving station. According to that claim, the transaction management entity of the mobile stations and the base station system uses the same transaction ID when the identifier designated by an application is the same as the previous one, and divides a message into a plurality of data segments. The transaction ID, corresponding to the respective port number and a sequential number, is added to each of the data segments. A message is sent as a plurality of data segments with the transaction ID and the sequential numbering.

According to the system of claim 11, every application can specify an arbitrary number as a transaction ID at an arbitrary time. Therefore, an application may designate re-sending of data segments even when a communication peer does not respond, as in the case of broadcast communication. Therefore, the invention as defined by claim 11 achieves a reduced error rate in communication when, for example, in the case of a broadcast, communication cannot be completed. See the specification at page 39, lines 8-18, page 34, lines 9-15, and page 64, lines 13-21, as well as Figure 32.

As described above with respect to claim 1, Garinger, which was cited as supplying this feature of the invention, does not do so. Garinger's communication system simply does not permit re-sending, at an arbitrary time, of previously unsuccessful communications because Garinger does not permit two outstanding transactions with the same transaction ID. For that reason, claim 11 and its dependent claim 13, further distinguish from the prior art.

Claims 16 and 18 were rejected on the same basis as claim 1 and further in view of Wang. In the system according to claim 16, the transaction management entity uses a bulk area prepared by an application which indicates a buffer region for assembling data segments into a message. Further, an indication of the size of the buffer region designated by an application is provided.

Wang, in column 15, lines 10-15, describes a simplified configuration of RAID discs. A RAID controller assigns a buffer area used by an application in a RAID disc system, according to various attributes that are indicated by that application. The technique employed by Wang cannot be applied to devices that have stringent constraints with respect to the memory capacity of mobile, i.e., on-board, embedded devices, such as used in vehicles according to the described DSRC communication system of the invention.

In the present invention, the communications protocol, which seems to have been compared to the RAID controller in Wang, provides only the mechanism of segmentation and assembly of data to communicate, while applications prepare buffer

areas used by the communication protocol. In other words, it is not necessary for the communication protocol to provide buffer areas for assembling segmented data into messages. Therefore, the present invention reduces the resources necessary for the operation of the entire system because it is sufficient if the applications prepare only a minimum buffer area that they use. See the specification at page 33, lines 3-5, page 34, lines 1-8, page 42, lines 9-9 and the passage from page 59, line 13 through page 60, line 9. Since Wang does not supply the proposition for which it was cited, claim 16 is patentable over the publications applied in rejecting that claim. Claim 18 is patentable over the combination of references because Wang does not supply the part of claim 1, from which claim 18 depends, that is missing from the three publications applied in rejecting claim 1.

Claim 19, formerly an independent claim, is now a dependent claim depending from claim 1. Therefore, the rejection made with respect to former claim 19 may no longer be applicable. In any event, Applicants submit that amended claim 19 distinguishes from the combination of ARIB STD-T75 and Fite. In the invention according to claim 19, a transfer service processing entity sends a list of accessible ports registered by applications of the transfer service processing entity to a peer station, of the mobile station and the base station system, when a DSRC connection is established. Fite, at column 2, lines 33-39, only describes utilizing a list of ports to select a port for use. Fite does not describe how to obtain a list of ports.

In the invention, upon receipt of notification of a connection, the transfer service processing entity sends, automatically, a list of accessible ports registered by an application. The invention reduces the time of initial connection and suppresses unfruitful communications. That feature distinguishes the invention from the references applied in rejecting former claim 19. The feature of the invention relied upon in distinguishing from those references is supported at page 24, lines 8-32 of the specification as well as by Figure 18.

Claims 24 and 25 have been amended so that they depend directly or indirectly from new claim 27, a claim not previously examined. For that reason, the former rejections of claims 24 and 25 are moot and do not need response.

Claim 27 distinguishes from all of the references applied in rejecting the formerly examined claims. ARIB STD-T75 merely defines the basic components of the underlying DSRC system, which the claimed method uses as the lower level transmission mechanism. DSRC ITS, proposes a general concept of the Application Sub-layer Extended Link Control Protocol (ASL-ELCP). As addressed in the specification, see page 2, line 10 to page 4, line 8, the combination of ARIB STD-T75 and DSRC ITS provides a communication system having extended capacities, which are still restrictive due to issues related to overheads, message sizes, and the like. See the specification at page 3, line 15 to page 4, line 8. Therefore, the ASL-ELCP technique described in DSRC ITS should not be confused with the LPCP layers described in claim 27.
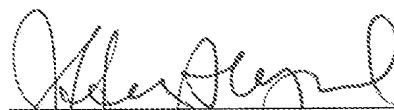
The DSRC ITS reference lacks any teaching that would enable one skilled in the art to conceive of the method defined in claim 27. In particular, the DSRC ITS reference merely shows a general system structure which lacks the particular internal components as defined in independent claim 27 and depicted in the patent application.

The Garinger, Wang, Fite, Kadambi, and Young references do not compensate for the deficiencies of the ARIB STD-T75 and the DSRC ITS references because they also lack the teaching of the features of claim 27 that are missing from the ARIB STD-75 and the DSRC ITS references. Further, these additional references do not relate to the DSRC protocol and, therefore, cannot provide enabling teachings to cure the defects of the DSRC ITS reference.

No combination of the cited references can suggest the invention as defined by new independent claim 27. Dependent claims 23 and 24 depend directly or indirectly from independent claim 27 and are, therefore, also patentable over the cited references.

Reconsideration, withdrawal of the rejection, and allowance of claims 1, 11, 13, 16, 18, 19, 24, 25, and 27 are earnestly solicited.

Respectfully submitted,

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